

Section 210.

Shoreline Features

A. Introductory Findings

1. A great variety of geologic forms can be found where tidal waters meet the land. Where a coast is exposed to the forces of the open ocean, as along the South Shore, sea cliffs and wide sand or gravel beaches predominate. In sheltered waters, salt marshes and mud flats are common. The shoreline of Narragansett Bay is composed principally of narrow beaches of pebbles and cobbles that are backed by an often unvegetated bluff of unconsolidated glacial sediment. Rhode Island's diversity of shoreline types provides a wealth of visually distinct areas, each of which supports different mixtures and intensities of use. This diversity must be recognized and maintained. The postwar decades have brought an explosion in the development of formerly rural coastal lands, and by the early 1980s most of the waterfront property that could be readily developed had been subdivided. Nearly all the remaining available parcels are within existing developments or they present natural constraints to the developer, such as poorly draining soils or steep slopes. Despite the recent surge of building along the lower Bay and South Shore, the coastline has retained much of its beauty. The appearance of long stretches of the coast from the water and vantage points along the shore provides a sense of natural beauty and open land; structures are not overly obtrusive. This quality, however, could be lost over the next few decades as the remaining farmland and estates, now worth great sums, come on the market and are sold off as house lots. Another major concern for the Council is the cumulative impact of individually minor alterations, particularly those brought about by residential development, on the qualities of the coastal environment.

2. All shoreline systems are dynamic, and change their shape and character in response to storms, tidal currents, human modifications, and the gradual rise in sea level. Twenty-five thousand years ago, at the time of maximum advance of the last glacial ice sheet, the ocean shoreline of Rhode Island was displaced over 15 miles seaward of Block Island. Sea level was lowered about 300 feet because ocean water was locked up in the glacial ice. Sea level began to rise as the ice melted, displacing the shoreline northward as the sea inundated Block Island Sound, and later, Narragansett Bay. Sea-level rise is also due to subsidence of the land and thermal expansion of ocean waters.

3. A principal concern of waterfront property owners is frontal erosion and storm-surge flooding. The susceptibility of any length of shoreline to erosion is determined by the type of shoreline (see Table 3) and its exposure to storm surge and waves during severe storms and hurricanes. Storm surge occurs when a combination of low atmospheric pressure and the force of high winds over a large expanse of open water causes sea level to rise dramatically along the coast, particularly at the head of funnel-shaped embayments like Narragansett Bay. During the 1938 hurricane, the storm surge forced water levels 12 feet above mean high water at Point Judith and over 13 feet at Providence. Waves 10 feet high and more were measured on top of the surge level. Such events are not rare; the state has been struck by 73 hurricanes in the past 350 years, 13 of which have caused severe flooding and erosion. In this century, the 1938 hurricane left 311 dead and nearly 2,000 houses destroyed, and Hurricane Carol killed 15 people and destroyed 3,800 houses in 1954.

4. In Rhode Island, most shoreline erosion takes place during moderate and severe storms, with recovery of sediment to beaches and foredunes in intervening periods. Many of today's shorefront residents acquired property in the middle 1980's during a period of relatively few storms and are unfamiliar with sustained periods of storminess or high category hurricanes. Most private shoreline protection structures which predate the RICRMP are underbuilt or poorly designed with respect to major storms.

5. The federal flood insurance program guarantees subsidized insurance for buildings that meet defined construction standards in flood hazard areas. This program has encouraged building in some highly hazardous areas contrary to good coastal management practices.

Table 3. Shoreline Types and Their Susceptibility to Erosion (Adapted from Boothroyd and Al-Saud, 1978).

(A, most susceptible; E, least susceptible)

<i>Type</i>	<i>Characteristics</i>	<i>Example areas most susceptible to erosion due to their exposure</i>
<i>Beaches (A)</i>	Unconsolidated sand, gravel or cobbles, backed by a headland bluff.	Oakland Beach (Warwick) Matunuck Beach (S. Kingston) Scarboro Beach (Narragansett)
<i>Barrier Spits (A)</i>	Unconsolidated sediment that forms a spit parallel to the mainland and separated from it by a marsh or pond; Sand dunes are often present.	All South Shore barriers South side Conanicut Pt. (Warwick) Barrington Beach (Barrington) Jenny Pond spit (Prudence Island) Briggs Marsh barrier (Little Compton)
<i>Headland Bluffs of Glacial Outwash (B)</i>	Gravel, sand, silt, and clay deposited in glacial rivers and lakes as ice melted 15-18,000 years ago.	Buttonwoods (Warwick) Occupessatuxet Neck (Warwick) Coggeshall (Warren) Island Park (Portsmouth)
<i>Headland Bluffs of Glacial Till (C)</i>	Unsorted mixture of gravel to clay deposited in contact with glacier ice.	Northeast side of Pt. Judith (Narragansett) Briggs Pt. (Little Compton)
<i>Soft Bedrock (D)</i>	Sedimentary rock usually in the form of terraces or scalloped cliffs.	East shore of the Bonnet (Narragansett) East facing segment of the Newport Cliffs
<i>Hard Bedrock (E) and Discontinuous Bedrock</i>	Hard bedrock is composed of granite and metamorphic rocks; Discontinuous bedrock, either hard or soft, often extends from the shore as a natural breakwater.	Least susceptible to erosion